RocketRAID 2644X4

SAS Host Adapter

User's Guide

HighPoint

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HighPoint Technologies, Inc.

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Chapter 1
Introduction

Contents of this Chapter:

About this guide
Introducing the RocketRAID 2644X4 SAS Host Adapter
Product Features
Understanding RAID Concepts and Terminology

About this Guide

The RocketRAID 2644X4 SAS Host Adapter's User's Guide provides information about the functions and capabilities of this host adapter product, and instructions for installing, configuring and maintaining RAID arrays hosted by this adapter cards.

Introducing the RocketRAID 2644X4 Host Adapters

The RocketRAID 2644X4 is high-performance SAS RAID solution, delivering reliability to demanding data-intensive applications such as tiered storage environments (disk-to-disk or disk-to-disk-to-tape backup), security and surveillance, video editing, and digital content creation.
Support for both SAS and SATA 3Gb/s drives on the same controller maintains configuration optimization for performance based on the characteristics of SAS and SATA drives available today.

Host Adapter Architecture

- PCI-Express x4 (adjustable to x1 speed with jumper)
- 1 External mini-SAS(SFF-8088) Driver Connector
- Up to 4 SAS/SATA Hard Drives
- 128 max hard drives via SAS expanders
- NCQ (Native Command Queuing)
- Low Profile

Advance RAID Features

- Support RAID 0,1,5,10 and JBOD
- Multiple RAID support
- Multiple logical drive support
- BIOS booting support
- Online Array roaming
- Automatic drive (insert / remove) detection
- Automatic RAID rebuild
- 64bit LBA support greater than 2TB per volume
- S.M.A.R.T (Early Warning System)
- TerabyteGuard. for data protection and reliability

- Bad sector repair and remapping to reduce dropped drives

Array Monitors, Alerts and Indicators

- Email Notification
- Alarm/Buzzer alerts for drive/array failure

RAID Management

- Online Capacity Expansion (OCE) and Online RAID Level Migration (ORLM)
- Quick and Background initialization for instant RAID configuration
- Write Back and Write Through support
- API library for customization
- CLI (Command Line Interface)
- Web GUI RAID management (local and remote monitoring)
- SHI (Drive analysis driven from S.M.A.R.T)

Operating System Support

- Windows 2000, XP, 2003, 2008 and Vista (32 and 64 bit)
- Linux (Fedora Core, Red Hat Enterprise Linux / CentOS, SuSE)
- Mac OS X 10.4.x and above
- FreeBSD
- Linux Open Source

PHYSICAL SPECIFICATIONS

Size : 79.3mm X 62mm X 1.6mm

EMI : FCC Part 15 Class B and CE

Thermal and Atmospheric Characteristics:

Work Temperature Range : +5 ℃ ~+ 55 ℃

Relative Humidity Range : 5% ~ 60% non condensing

Storage Temperature : -20℃ ~ +80 ℃

MTBF: 920,585 Hours

Electrical Characteristics:

PCI-e : 3.3V

Power: 5W

Understanding RAID Concepts and Terminology

The following concepts and terminology is commonly used when describing the functions of the RocketRAID Host Adapter cards.

Disk Status

New The disk contains no data and has not been initialized.

Initialized The disk has been initialized and can be used for array creation.

Configured The disk has been assigned to one or more arrays, or configured as a spare disk.

Legacy The disk was used on other controllers before use with the RocketRAID 2644X4.

Array initialization

A redundant array (RAID5, RAID1, RAID10) needs to be initialized to ensure full performance and reliability. Non-redundant arrays (RAID0, JBOD) do not need to be initialized.

When you create a redundant array using the host adapter's BIOS Configuration Utility, it will create the array in un-initialized state. The initialization process can be completed after installing the driver and management software.

When creating an array using the HighPoint RAID Management Console software, you can specify an initialization option (Skip initialization, foreground and background).

Foreground initialization

Foreground initialization will zero-out all data on the array. The array is not accessible by the operating system until initialization is complete.

Background initialization

Background initialization allows the array to be used immediately. For RAID1 and RAID10 arrays, initialization will results in data being duplicated identically to the mirror pair. For RAID5 arrays, initialization will result in parity being generated from all array members.

Note: *An un-initialized RAID1 or RAID10 array can still provide redundancy in case of a disk failure. A RAID5 array, however, is not fault-tolerant until initialization is finished.*

Online Capacity Expansion (OCE)

This feature allows disks to be added to existing RAID arrays, in order to increase the array's capacity, without fear of data loss. Any number of disks can be added to an array, at any time. Data can be accessed and utilized even while being redistributed.

Online RAID Level Migration

This term describes the ability to change one type of array (RAID level), into a different type of array (changing a RAID 1 array into a RAID 10 array for example). Data is still accessible during the migration process, and a base level of security is still active.

OCE, ORLM and the RocketRAID 2644X4

This host adapter support both Online Capacity Expansion (OCE), and Online RAID Level Migration (ORLM). Both features are supported by a single function - an array can be transformed from one RAID level to another RAID level while simultaneously being resized, even under I/O load.

Spare disk

A spare disk is a single disk that can be used to automatically rebuild a redundant array in case of drive failure. Spare disks may also be members of a RAID array. Any available space on these disks may be used to rebuild other broken arrays.

Legacy disk

Disks attached to the host adapter that contain valid partition tables will be identified as "legacy" disks. A legacy disk attached to the host adapter can be accessed by the operating system, but cannot be used to create RAID arrays. A legacy disk must be initialized before assigning it to an array.

Chapter 2
Hardware Description/Installation

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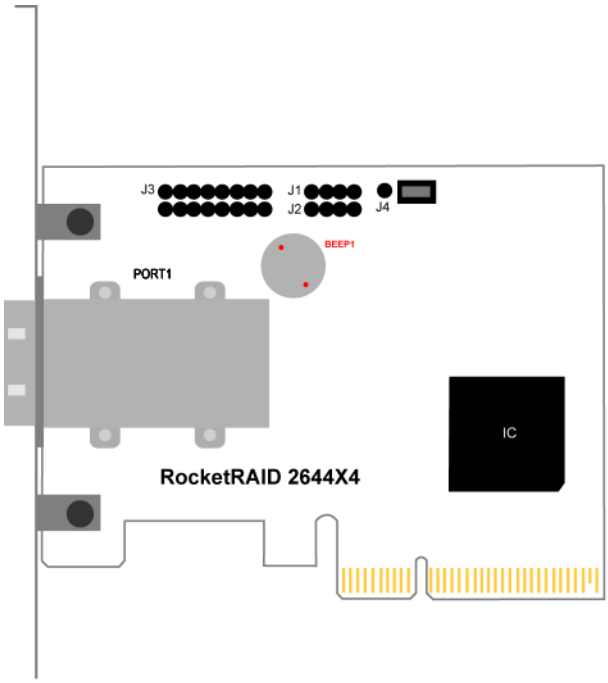
RocketRAID 2644X4 Hardware
1 - RocketRAID 2644X4 Host Adapter Layout
2 - Installing the RocketRAID Host Adapter
3 - Verifying Installation

1 – RocketRAID 2644X4 Host Adapter layout

RocketRAID 2644X4



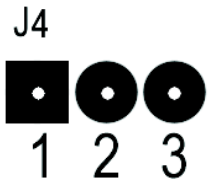
Port1

This represent the host adapter's one external Mini-SAS port. It can support up to 4 SAS/SATA Hard Drives.

J3 is reserved

J4

These jumper can be used to select PCI-E work model. As following:



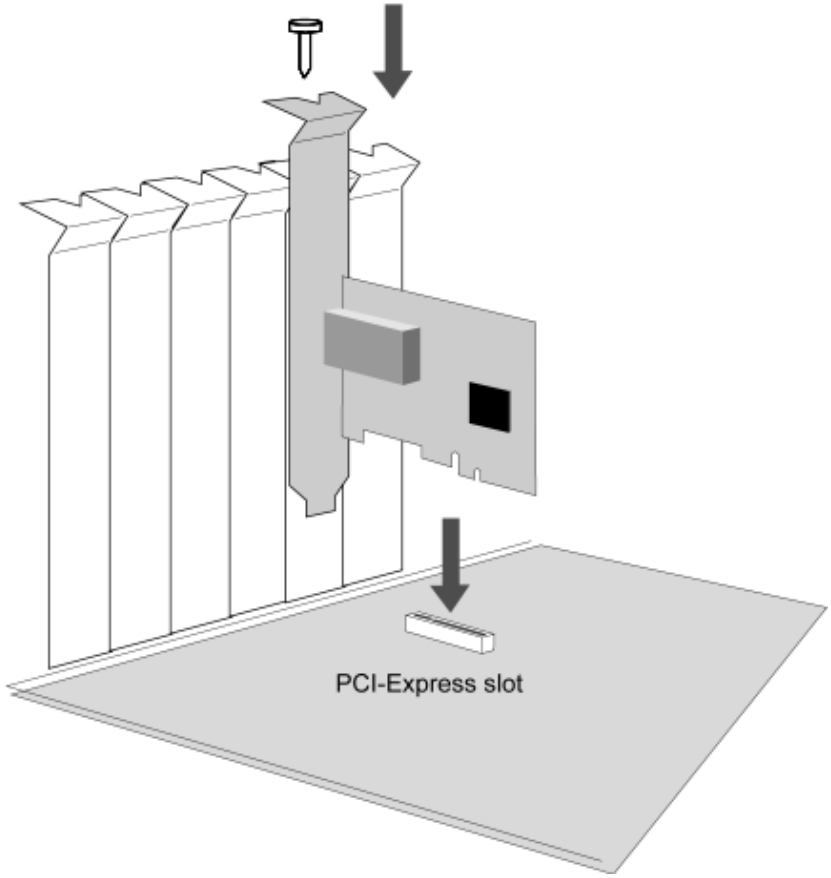
Connect Pin 1 and Pin 2 support PCI-E X1, and connect Pin 2 and Pin 3 support PCI-E X4.

2 - Installing the RocketRAID Host Adapter

Note: Make sure the system is powered-off before installing the RocketRAID host adapter.

The RocketRAID 2644X4 include both standard and low-profile brackets. It may be necessary to attach the low-profile bracket in place of the standard bracket, depending upon the chassis design. The RocketRAID 2644X4 is a full-height card, and is not designed for use with low-profile chassis.

1. Open the system chassis and locate an unused PCI-Express x4.
2. Remove the PCI slot/bracket cover.
3. Gently insert the RocketRAID card into the PCI-Express slot, and secure the bracket to the system chassis (*illustration below shows RR2644X4*).



4. After installing the adapter, attach hard disks to the host adapter using the data cable. The RocketRAID 26444X4 model utilizes standard Internal SATA to SAS cables – four are included in each retail box. This card can support up to four SAS/SATA hard disk drives.

   The RocketRAID 2644X4 includes 4 internal SATA to SAS cables. It can support up to four SAS/SATA hard disk drives.

Note: Many server-level chassis include hard-disk hot-swap bays. For these system chassis, cables are attached to the chassis backplane, rather than directly to each individual hard disk. Consult the chassis's manual for proper installation procedures.

5. Close and secure the system chassis.

3 - Verifying Installation

Once the host adapter and hard disks have been installed into the chassis, boot-up the system to verify that the hardware is properly recognized.

1. Power on the system. If the system detects the presence of the adapter, the RocketRAID BIOS Utility will be displayed during boot up.
2. Press **Ctrl+H** to access the RocketRAID adapter's BIOS Utility.

The BIOS Utility will display information about hard disks attached to the adapter. Make sure all attached disks are detected by this utility. If any of the hard disks are not detected, power down the system and check the power and cable connections.

Chapter 3
BIOS Utility

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RocketRAID 2644X4 BIOS Utility
1 - BIOS Command Overview
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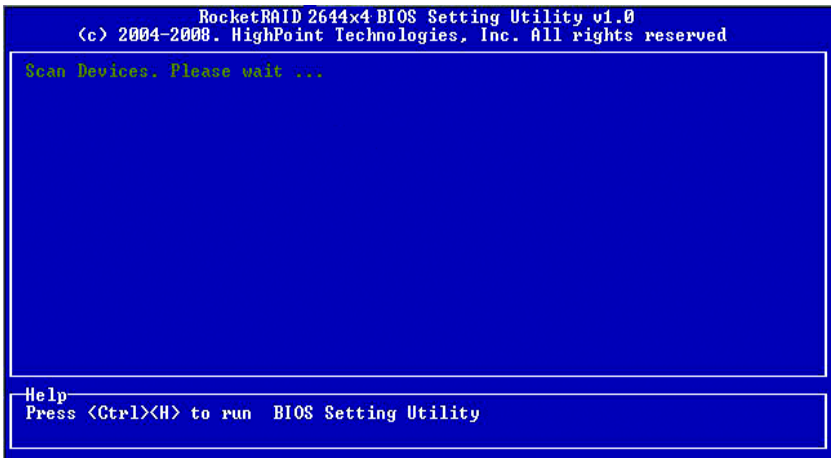
4 - Updating the BIOS
5 - BIOS – Additional Settings

RocketRAID BIOS Utility

Access the RocketRAID host adapter's BIOS utility using the "Ctrl + H".
This command should be displayed automatically when the host adapter's BIOS screen appears during the system's boot up procedure.

1 - BIOS Command Overview

The BIOS Utility provides a wide selection of RAID related commands. These commands are displayed towards the top of the utility's interface.


RocketRAID 2644x4 BIOS Setting Utility v1.0
(c) 2004-2008. HighPoint Technologies, Inc. All rights reserved
Scan Devices. Please wait ...
Help
Press <Ctrl><H> to run BIOS Setting Utility

Use the ← →arrow keys to scroll through the various commands, and the ↑ ↓ arrows to browse through the corresponding command menus. Use the ENTER key to execute the selected command.

The ESC button can be used to cancel the selected command, or return to the previous command menu.

Create - this command is used to create RAID arrays. Section 2 discusses this command in detail.

Delete - this command will delete the selected RAID array.

Warning: *This command may result in permanent data loss - it should only be used if data stored on the target array is no longer relevant, or has been backed up to an alternate storage device.*

Add/Remove Spare - this command is used to assign hard disks to function as spare disks. The controller is capable of using spare disks to automatically rebuild broken or faulted RAID arrays.

Section 3 discusses this command in detail.

Settings

Set Boot Mark - this function is used to designate a particular disk or RAID array to function as the host adapter's boot device.

Note: *This setting is only relevant if the motherboard's BIOS has set the host adapter to function as the system's primary boot device.*

Staggered drive spin up – This function is used to enable (or disable) staggered drive spin up support This setting, by default, is disabled. Enabling staggered drive spin up will power up the hard disks one at a time, approximately every two seconds.

View – this command is used to select between two views. Press the ENTER key to change the view.

Devices – displays information about hard disks attached to the host adapter. Use the ↑ ↓ arrow keys to highlight the target hard disk, and press ENTER to view the information.

RAID Arrays – displays information about RAID arrays attached to the host adapter. Use the ↑ ↓ arrow keys to highlight the target array, and press ENTER to view the information.

Initialize - this function is used to prepare disks for use with RAID arrays.

Note: *Arrays cannot be created between disks that have not been initialized.*

The following section discusses this command in detail.

2 - Creating RAID Arrays

Initializing Disks:

Before creating a RAID array, the disks must be initialized.

Initialization writes necessary RAID configuration information to the hard disk.

Use the ← →arrow keys to select the **Initialize** command, and press ENTER.

Warning: *Initialization will destroy all pre- existing data on the selected hard disks.*

Use the ↑ ↓ arrow keys to highlight the target hard disk(s) and press ENTER. Next, press the **Y** (yes) key to initialize the selected disk(s), or **N** (no) key to cancel the initialization process.

Once initialized, these disks can be utilized to create RAID arrays.

To create an array:

1. Use the ← → arrow keys to highlight the **Create** command, and press ENTER to open the Create Menu.
2. Use the ↑ ↓ arrow keys to select the appropriate RAID level, then press ENTER.
3. Next, use the ↓ arrow key to highlight the **Array Name** option and press ENTER. The array name dialogue box will appear. Use the keyboard to input a new Array Name, and press the Enter key.

   Note: *the Array Name command is optional – it is not necessary to name the array. The array can be named at a later time, and the name of the array can be changed at any time.*
4. On the Create menu, use the ↓ arrow key to highlight the **Select Devices** item and press ENTER. A device list will appear, and display all available hard disk drives.
5. Highlight the target disks that you want to use, and press ENTER to select them. After all of the disks have been selected, press the ESC key to return to the Create Menu.
6. Next, Use the ↓ arrow key to highlight the **Capacity (GB)** option and press ENTER. The total available capacity will be displayed. Press ENTER if you wish to use all available space.
7. If you wish to reserve disk space for additional arrays/single disks, use the keyboard to input the amount of space (in GB) you wish to set aside for this particular array, and press ENTER.

Note: *Multiple arrays can be created using the same set of hard disk drives. The Capacity option allows you to set aside disk space that be used to create another array, set as a spare disk, or partitioned to act as a single disk (by the operating system).*

8. To complete the creation procedure, use the ↓ arrow key to highlight the **Start Creation** item and press ENTER. Press the **Y** (yes) key to create the array, or **N** (no) key to cancel the creation process.

3 - Adding/Remove Spare Disks

This command is used to assign a hard disk to act as a Spare Disk.

Spare Disks are used to automatically rebuild Redundant RAID arrays (RAID 1, 5, 10) in the case of disk failure. To set a hard disk to act as a Spare Disk, use the ↑ ↓ arrow keys to select a disk, and press ENTER.

To remove the Spare Disk setting from a hard disk, highlight the spare disk, and press ENTER.

Generally, single disks are designated to act as spares (disks that are not configured into RAID arrays).

However, in some instances, disks that are members of RAID arrays may also be designated to act as a spare. If the disks in question are part of a RAID array that did not utilize the full available capacity at the time of creation, these disks may be used as spares.

For example: a RAID 0 array was created between two 200GB hard disks, but only 200GB of space (out of a grand total of 400GB), was assigned to that array. In this example, 200GB of disk space remains unallocated. This unallocated space would allow these disks to be set as spares for a separate redundant array that falls into the same capacity range (200GB).

4 - Updating the BIOS

BIOS updates are released periodically, and posted on our website for download. There are several ways to flash the host adapter's BIOS.

For Windows based operating systems:

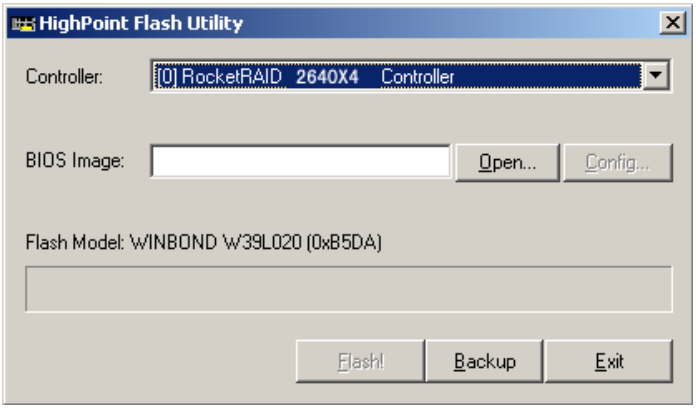
1. Download the desired BIOS update from the Support section provided for the host adapter. Extract the download to the directory of your choice.

2. Insert the Driver and Software CD included with the retail box into the system's CD-ROM or DVD drive.

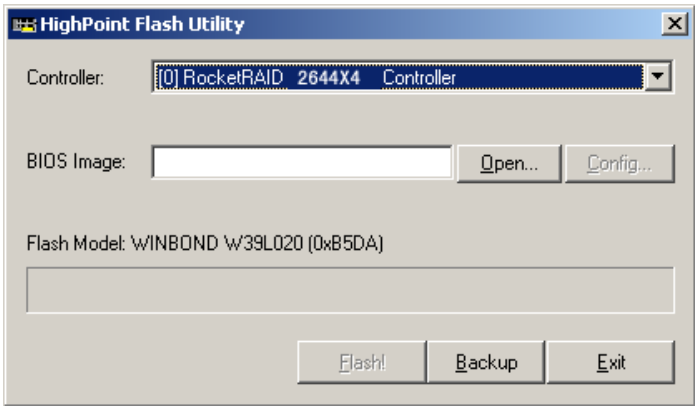
3. The CD should autorun, and display the following screen:

4. Select the "Browse the CD" option, and access the directory provided for the RR2644X4 host adapter.

5. Open the "BIOS" directory, and double click the "hptflash.exe" icon. This will start the BIOS flash utility (RR2644X4 example below):



5. Open the “BIOS” directory, and double click the “hptflash.exe” icon. This will start the BIOS flash utility (RR2644X4 example below):



6. Select the appropriate model from the drop down menu labeled “Controller”, and press the “Open” button – this will allow you to browse to the extracted BIOS download (step 1).

7. Highlight the image file, and click the “Flash!” button. The utility will update the card, then verify the update.

8. Once complete, click on the “Exit” button to close the utility. Shutdown and reboot the system.

Note: the “Backup” button will save a copy of the card’s current BIOS to the directory of your choice.

For other operating systems:

In order to update the BIOS, the system must be booted into DOS mode, using a DOS-boot diskette or CD image.

1. Copy the load.exe and the bios image file to the bootable floppy diskette (you may need to use a different floppy depending upon how much space is available on the boot diskette - this can vary).

2. If you are booting from a CD image, you will need to add these files to the CD. Insert the boot image media into the appropriate drive, and boot the system.

3. Once the A:\> prompt has appeared, insert the media that contains the required BIOS files, and type the following command:

   load xxx.xxx

Then, press enter.
Note: xxx.xxx = the name of the BIOS image file (type it exactly as it appears).

4. The utility will scan for the controller, and ask if you want to backup the BIOS (save a copy of the current BIOS to a floppy diskette). This is optional - you can answer No, and continue.

Note: This option will not function if the system was booted from CD.

5. The utility will then ask if you want to flash the controller (upgrade the BIOS). Select Y for yes.

6. The utility will display a progress bar during the flash procedure, then will attempt verify the update.

7. Once complete, the system can be rebooted.

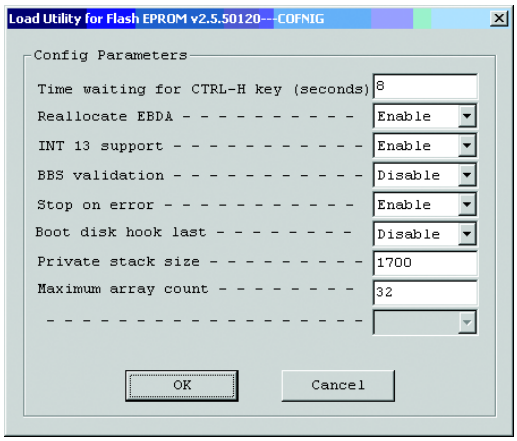
5 - BIOS – Additional Settings

The RocketRAID host adapter's BIOS utility has several other configurable settings that can be accessed when flashing the BIOS.

Using the hptflash.exe utility (from within a Windows operating system):

Click on the "Configure" button from the main interface window.

The following window will appear:


Load Utility for Flash EPROM v2.5.50120---COFNIG
Config Parameters
Time waiting for CTRL-H key (seconds) 8
Reallocate EBDA - - - - - - - - - - Enable
INT 13 support - - - - - - - - - - - Enable
BBS validation - - - - - - - - - - - Disable
Stop on error - - - - - - - - - - - Enable
Boot disk hook last - - - - - - - - Disable
Private stack size - - - - - - - - - 1700
Maximum array count - - - - - - - - 32
OK
Cancel

Use the drop down menus to enable or disable controller functions.

Using the DOS mode utility (load.exe):

Load xxx.xxx –c

Note: "xxx.xxx" refers to the BIOS image file.

A BIOS menu similar to the BIOS setup utility will be displayed.

This sub-menu allows the administrator to enable/disable various controller functions.

Several of the more common functions are described below:

Stop on Error – disabling this option will prompt the card to automatically skip error messages during bootup (broken array warnings), if the administrator does not input the "Ctrl + H" command to access the BIOS menu.

EBDA Reallocation – this function refers to "Extended BIOS Data Area".

Disabling this feature may remedy boot problems associated with motherboards that halt after the RR2644X4 BIOS screen is displayed.

INT13 – The card's boot function. Disabling this feature removes the card's ability to boot the system. This may be useful for systems that utilize multiple bootable controllers – some motherboards may not be able to load the BIOS of each device during boot up, which may impair the system's ability to boot from a specific device.

Chapter 4
Driver and Software Installation Microsoft Windows

Contents of this Chapter:

Driver and Software CD
Windows Driver Installation

Driver and Software CD

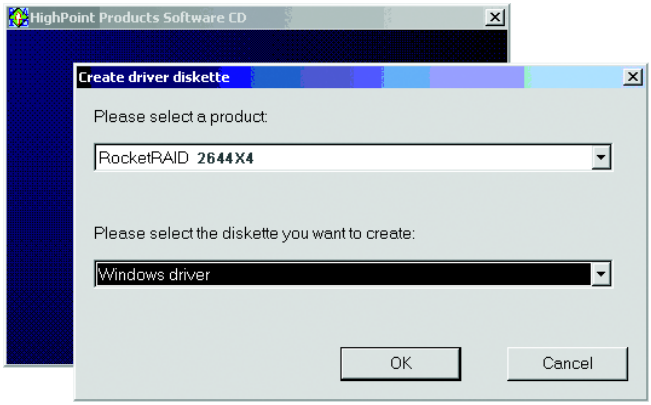
The retail box includes a Driver and Software CD.

This CD can be used to generate driver diskettes, and install the RAID Management software for a variety of operating systems.

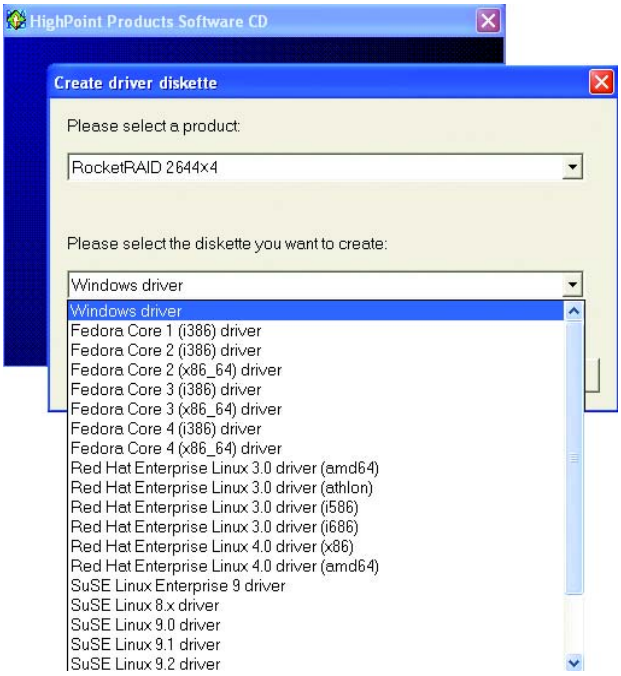
To create a driver diskette:

1. Insert the CD into the system's CD/DVD drive. The program should start automatically.
2. Insert a blank floppy diskette into the system's floppy drive.
3. Click on "Create Driver Diskette".

4. Click on the "Please Select a Product" drop-down button, and select the appropriate host adapter model from the list.



5. Click on the “Please Select the Diskette you want to create” drop-down button, and select the appropriate OS from the list.


HighPoint Products Software CD
Create driver diskette
Please select a product:
RocketRAID 2644x4
Please select the diskette you want to create:
Windows driver
Windows driver
Fedora Core 1 (i386) driver
Fedora Core 2 (i386) driver
Fedora Core 2 (x86_64) driver
Fedora Core 3 (i386) driver
Fedora Core 3 (x86_64) driver
Fedora Core 4 (i386) driver
Fedora Core 4 (x86_64) driver
Red Hat Enterprise Linux 3.0 driver (amd64)
Red Hat Enterprise Linux 3.0 driver (athlon)
Red Hat Enterprise Linux 3.0 driver (i586)
Red Hat Enterprise Linux 3.0 driver (i686)
Red Hat Enterprise Linux 4.0 driver (x86)
Red Hat Enterprise Linux 4.0 driver (amd64)
SuSE Linux Enterprise 9 driver
SuSE Linux 8.x driver
SuSE Linux 9.0 driver
SuSE Linux 9.1 driver
SuSE Linux 9.2 driver

6. Click on the “OK” button to create the driver diskette.

To install the RAID software:

1. Click on “Install RAID Management Software”.

2. Select the desired software from the drop down menu, and click on the “OK” button.

Windows Driver Installation (Win2000, XP, Win 2003, Win 2008)

Before installing the RocketRAID host adapter's device driver, make sure the RocketRAID host adapter and all required hard disks have been installed into the system's chassis/disk enclosure (refer to the Hardware Installation section).

Installing the RocketRAID driver for an existing Windows system

After the operating system has booted, Windows will automatically detect the RocketRAID host adapter, and request that a device driver be installed. To install the device driver, follow the steps outlined below:

1. When the "Found New Hardware Wizard" window appears, select "Install from a list or specific location (Advanced)", and click Next to continue.
2. Click on the "Include this location in the search" option, and select the system's floppy drive (generally Disk A). Next, insert the Driver Installation diskette into the system's floppy drive.
3. At the Hardware Wizard screen, select the floppy drive as the source, then click the Next button. Select the appropriate operating system folder, then click the Next button.
4. Windows will display a warning message that states the driver has "not been signed". Select "Continue Anyway", then click Finish when prompted. When windows asks to reboot the system, choose No.
5. Windows will then display a second "Found New Hardware Wizard" window – repeat steps 1 through 4.
6. Remove the Driver Installation diskette from the floppy drive, then Shut down and restart the computer.

Installation Verification

After the driver has been installed, and the system has been restarted:

1. Click the Start button, then right-click My Computer icon. Select the Properties item from the pop up menu.
2. In the popup window,select Hardware tab and then click Device Manager button.

3. Double click the “SCSI and RAID controllers” entry. If the RocketRAID device entry is not displayed, or there are “?” or “!” marks displayed near the RocketRAID entry, the driver has not been installed properly. Delete the entries and reinstall the driver.

Installing the RocketRAID driver during a fresh Windows installation

1. After booting from the Windows CD or DVD-ROM, when the Windows Setup blue screen appears, look towards the bottom of the screen. Windows will prompt you to press the F6 key if you want to install a third party SCSI or RAID driver. Press the F6 key at this time.
2. The setup procedure will continue, and will later instruct you to press the “S” key to specify additional adapters. Press the “S” key as instructed.
3. Next, the setup program will prompt for the insertion of the driver diskette. Please insert the driver diskette, and then press ENTER to continue.
4. The next window will display several driver options. Please select the driver for the corresponding operating system, and press ENTER to continue.

Windows Vista Driver Installation

Installing the driver during a fresh Windows Vista installation

1. Boot from Windows Vista DVD.
2. When the screen “where do you want to install Windows” appears, click “Load driver” and browse for the driver location. Windows Vista can install drivers from several media types: floppy diskette, USB flash disk or CD.
3. Select the RocketRAID 2644X4 controller driver, and click “Next”.
4. The driver is now installed - you can now continue on with the installation procedure.

Installing the driver for an existing Windows Vista system

1. Install the RocketRAID 2644X4 host adapter into the PC, then boot up Windows Vista.

2. Windows should automatically detect the card, and display the “Found New Hardware” wizard pop-up window. Select “Locate and install driver software”. When Windows asks: “Windows needs your permission to continue”, select “continue”.
3. Select “I don’t have disc, show me other options” and then select “Browse my computer for driver software”.
4. Specify the location of the driver and click “Next”.
5. When asked: “Would you like to install this driver software?”, select “Install”.
6. Reboot the system when prompted. The RocketRAID 2644X4 will be available for use after Vista reboots.

Installation Verification

After the driver has been installed, and the system has been restarted:

1. Click the Start button, then right-click My Computer icon. Select the Properties item from the popup menu.
2. In the popup window, select Hardware tab and then click Device Manager button.
3. Double click the “SCSI and RAID controllers” entry. If the RocketRAID device entry is not displayed, or there are “?” or “!” marks displayed near the RocketRAID entry, the driver has not been installed properly. Delete the entries and reinstall the driver.

Chapter 5
Web-RAID Management Interface

Contents of this Chapter:

RocketRAID 2644X4 BIOS Utility
1 - Web RAID Management Interface
2 - Preparing Hard disks
3 - Array Management
4 - Device Management
5 - Configuring Spare Disks
6 - Managing Events and Tasks
7 - Settings

1 - Web RAID Management Interface

Note: To use the web-based RAID management interface, a web browser with XML support is required, e.g. Internet Explorer 6.0, Mozilla or Firefox.

To run the management interface, start your browser and enter the following URL address:

https://localhost:7402

If you are managing a remote system please change “localhost” to the server’s host name or IP address.

The default user name is “RAID” and the initial password is “hpt”. You can change the password after you have logged in.

***Note**: the login information is saved in /etc/hptuser.dat. If you forget the password you can remove this file to reset the password.*

If you can’t connect to the local system, please check and make sure a process named hptsvr is running. If hptsvr is not running, you can start it manually by using the following command (from a terminal window)

“/Library/StartupItems/Hptsvr/hptsvr”.

If you can’t connect to a remote system, make sure hptsvr is running on that system.

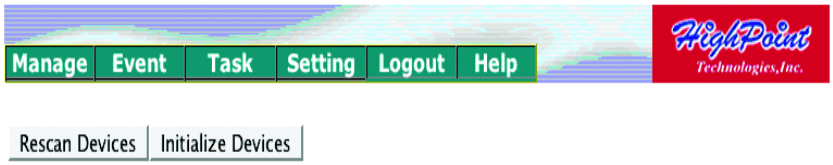
and you can access the remote system via TCP/IP connection. If you have a firewall configured, make sure TCP port 7402 is not blocked.

2 - Preparing Hard disks

Disks must be initialized before they can be configured into RAID arrays.

Initializing hard disks:

1. Select the “Manage - Device” function to access the device management page.
2. Click on the “Initialize Devices” button towards the upper portion of the interface screen.



3. Checkmark each disk you wish to initialize, and click the “Submit” button.

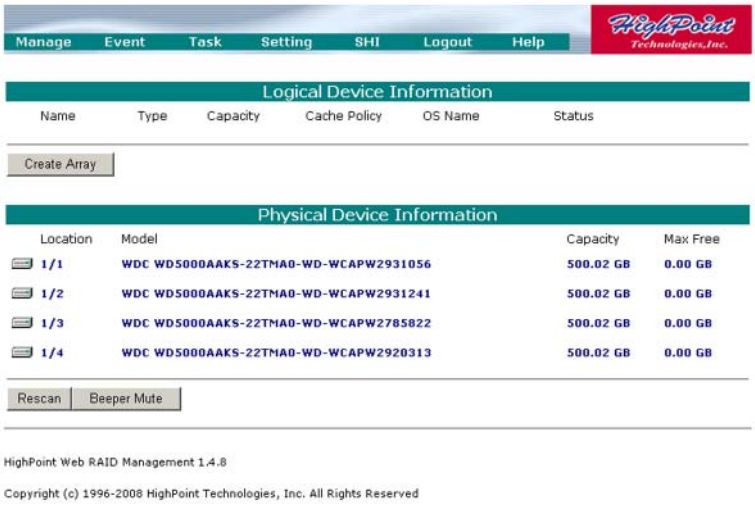
Warning: initializing disks may delete data stored on the selected disks.

3 - Array Management

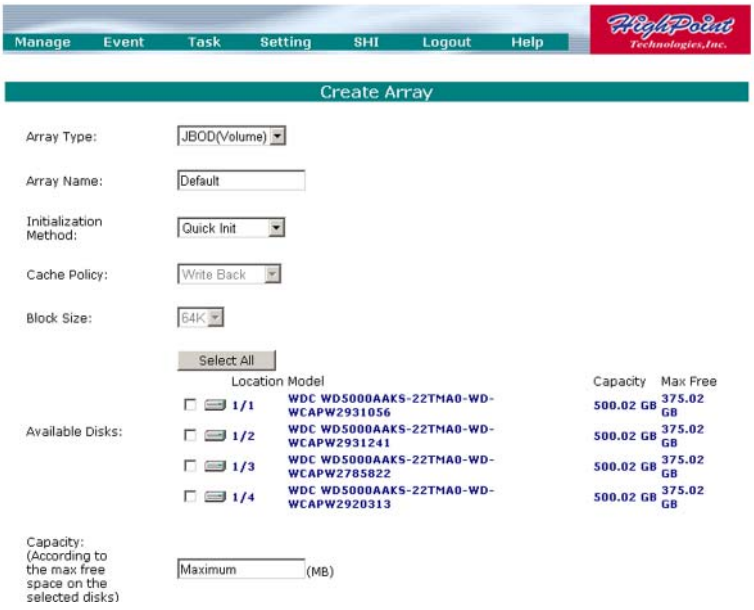
Creating an Array

To create an array:

1. Select "**Manage - Array**" from the menu.



2. Click the **Create Array** button. The create array page will appear.



3. Choose the array type you want to create from the drop-down list.
4. Enter a name for the array (this is optional)
5. If you are creating a redundant RAID array (RAID1, 5, 10), select an initialization option for the array.

Note: An un-initialized RAID1 or RAID10 array can still provide redundancy in case of a disk failure. A RAID5 array, however, is not fault-tolerant until initialization is finished.

6. If you are creating RAID5, specify a cache policy for the array:

Write-back

When the write-back setting is selected, writes to the array are cached. This will result in higher performance, but data loss may occur in case of a power failure.

Write-through

When the write-through setting is selected, writes to the array are always passed directly to the disks. Subsequent reads may still be completed from the cache, if appropriate.

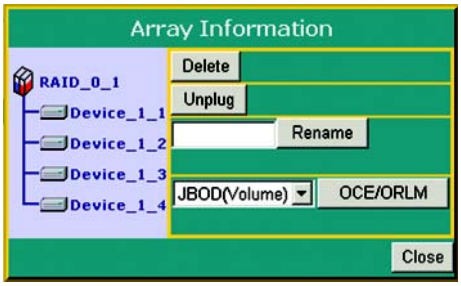
7. Select disks from the **Available Disks** list.
8. Enter a capacity for the array, or use the default value (the maximum capacity for the array).
9. Click **Create**. If you have specified an initialization option, the initialization process will start automatically.

Deleting an Array

To delete an array:

1. Select "**Manage - Array**" from the menu.

2. Click on the **Maintenance** button. An Array Information window will appear.



3. Click the **Delete** button.

***Note**: An array in use by the operating system cannot be deleted. Any data stored on a deleted array will be inaccessible*

Adding Disks to an Array

When an array member in a redundant array fails, the array will be listed as *broken*. A broken array will be automatically rebuilt using available-spare disks. However, if you have no spare disks configured, you can still rebuild by manually adding an Available Disk to the array. To add a disk to a broken array:

1. Select menu "**Manage - Array**".
2. Click the **Maintenance** button.
3. Click the **Add Disk** button.
4. If the disk is successfully added to the array, rebuild process will start automatically.

***Note:** If the system utilizes hot-swap capable enclosures, you can add new physical disks to the RocketRAID card in order to rebuild or modify an existing array, using the "Rescan" feature.*

Verifying an Array

For a RAID 1 or RAID1/0 array, verify process compares the data of one mirror pair with the other. For RAID 5, verify process calculates RAID5 parity and compares it to the parity data on the array. Verification checks each sector on a drive. Periodic verification of an array allows the disk drive firmware to take corrective actions on problem areas on the disk, minimizing the occurrence of uncorrectable read and write errors.

To verify an array:

1. Select menu "**Manage - Array**".
2. Click the **Maintenance** button.
3. Click the **Verify** button to start the verify process.

Rebuilding an Array

When a redundant array enters a critical/broken state, a rebuild is necessary to restore the array's redundancy (security). The rebuild process for an array generally starts automatically. If you have aborted a rebuild process, you can start it manually. To rebuild an array:

1. Select menu "**Manage - Array**".
2. Click the "**Maintenance"** button.
3. Click the "**Rebuild"** button. The rebuild process should begin.

Expanding/Migrating an Array

With the OCE/ORLM function, you can migrate an array from one RAID level to another RAID level and/or expand the array dynamically, even under I/O load. This function implements both Online Capacity Expansion (OCE) and Online RAID Level Migration (ORLM).

To expand/migrate an array:

1. Select "**Manage - Array**" from the menu.
2. Click the **Maintenance** button.
3. Select the target array type.
4. Click the **OCE/ORLM** button.
5. The OCE/ORLM page will appear. The interface is similar to the array creation wizard.

Note:

When expanding a JBOD array, all the original disks must be included in the target array, and these disks must be selected in the same order (as the original array). If you want to migrate a JBOD array to another RAID level, only the first member disk can be included in the target array. For example, a JBOD comprised of 3 disks (1, 2, 3), can only be "migrated" using disk 1. Disks 2 and 3 cannot be used – disk 1 would have to be combined with other disks attached to the RocketRAID card (4).

You cannot change an array to another type of array with a smaller capacity. In some cases, a disk may need to be added to the RocketRAID card.

During the OCE/ORLM procedure, the redundancy level of the array will be the lowest of the source and target arrays; e.g. if you ORLM a RAID0 array to a RAID1 array, the array will be non-redundant until the procedure is complete.

The OCE/ORLM process can be aborted and continued at later time. However, you should always stop the transform progress from the RAID Management software.

An unexpected system crash may result in data loss while performing OCE/ORLM on an array. We strongly recommend backing up data before starting the OCE/ORLM process.

After the OCE/ORLM procedure has completed, reboot the system.

Renaming an Array

To rename an array:

1. Select "**Manage - Array**" from the menu.
2. Click on the **Maintenance** button.
3. Enter a new name for the array.
4. Click the **Rename** button.

Note: An array running background tasks cannot be renamed.

4 - Device Management

Select the "Manage - Device" function to access the device management page.

Change Device Settings

Depending upon the capabilities RAID controller and hard disks drives in use, several configurable device settings may be available: Read Ahead, Write Cache, TCQ, and NCQ. Each feature can be enabled or disabled individually, for each hard disk.

SHI – Storage Health Inspector

The primary SHI interface displays a brief "health" summary of each hard disk.

Manage Event Task Setting SHI Logout Help
HighPoint Technologies,Inc.
Schedule
Storage Health Inspector(SHI)
Controller ID Port# Device Serial Number RAID °F Bad Sectors Found & Repaired Device Status
1 1 WD-WMASU05256125612 RAID_5_0 82 0 OK SMART
1 2 WD-WMASU05258225822 RAID_5_0 86 0 OK SMART
1 3 B361P6500BV5 RAID_5_0 95 None OK SMART
1 4 WD-WMASU05937563756 None 84 0 OK SMART

Controller ID

Which controller /card the disk is attached to.

Port #

Port location of the hard disk

Device Serial Number

Serial number of the hard disk

RAID

RAID/Non-RAID status

F

Temperature (in Fahrenheit) of the hard disk (Celsius is displayed under the SMART status)

Bad Sectors/Found & Repaired

The card is capable of repairing bad sectors – a summary of this activity is presented here.

Device Status

OK means the disk is in a healthy state. A Failed status suggests the disk was taken offline (due to a RAID, SMART or sector failure).

Schedule

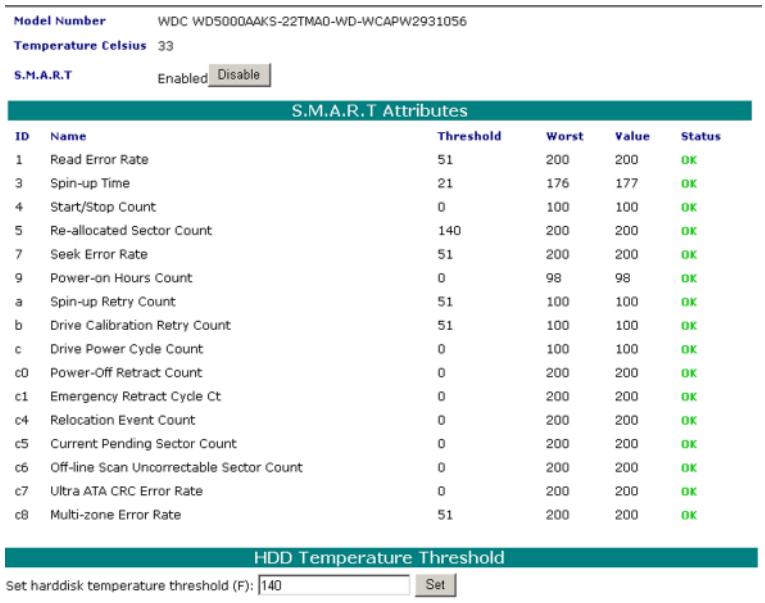
Click on the blue "Schedule" link to access the Event menu.

S.M.A.R.T Status

You can view S.M.A.R.T. (Self-Monitoring, Analysis, and Reporting Technology) data about a particular hard disk to help troubleshoot problems that occur. You can also setup periodically S.M.A.R.T. status checking to send notification messages when S.M.A.R.T. thresholds are exceeded.

To view the S.M.A.R.T status of a hard disk:

1. Select **"Manage - Device"** from the menu.
2. Click the "**SMART**" link to display the S.M.A.R.T information page.



Model Number	WDC WD5000AAKS-22TMA0-WD-WCAPW2931056
Temperature Celsius	33
S.M.A.R.T	Enabled Disable

S.M.A.R.T Attributes

ID	Name	Threshold	Worst	Value	Status
1	Read Error Rate	51	200	200	OK
3	Spin-up Time	21	176	177	OK
4	Start/Stop Count	0	100	100	OK
5	Re-allocated Sector Count	140	200	200	OK
7	Seek Error Rate	51	200	200	OK
9	Power-on Hours Count	0	98	98	OK
a	Spin-up Retry Count	51	100	100	OK
b	Drive Calibration Retry Count	51	100	100	OK
c	Drive Power Cycle Count	0	100	100	OK
c0	Power-Off Retract Count	0	200	200	OK
c1	Emergency Retract Cycle Ct	0	200	200	OK
c4	Relocation Event Count	0	200	200	OK
c5	Current Pending Sector Count	0	200	200	OK
c6	Off-line Scan Uncorrectable Sector Count	0	200	200	OK
c7	Ultra ATA CRC Error Rate	0	200	200	OK
c8	Multi-zone Error Rate	51	200	200	OK

HDD Temperature Threshold

Set harddisk temperature threshold (F): 140 Set

Note: S.M.A.R.T attribute data is drive-specific. The software includes a list of definitions for popular drive models/manufacturers. Unknown S.M.A.R.T. attributes will be shown as “unknown”. You can add the attribute definitions for your drive in the file smart.def (which resides in the software installation directory).

Rescan Devices

When you physically add drives to the controller while the system is running, you can rescan the controller to reflect the change.

To rescan the devices:

1. Select menu “**Manage - Device**”.
2. Click “**Rescan Devices**” button.

Note: When you are hot-plugging an entire array, run rescan ***only*** after all array members (hard disks) have been physically plugged or unplugged from the system. You can rescan all the devices at once using the Rescan function on the **Array Management** page.

5 - Configuring Spare Disks

To configure spare disks attached to the RocketRAID card, select the "**Manage - Spare**" function. The Spare Pool Management page will be displayed.

Adding a Spare Disk

To add a spare disk, select a disk from the *Available Disks* list and click **Add Spare** button. This will add the disk to the *Spare Pool* list.

Removing a Spare Disk

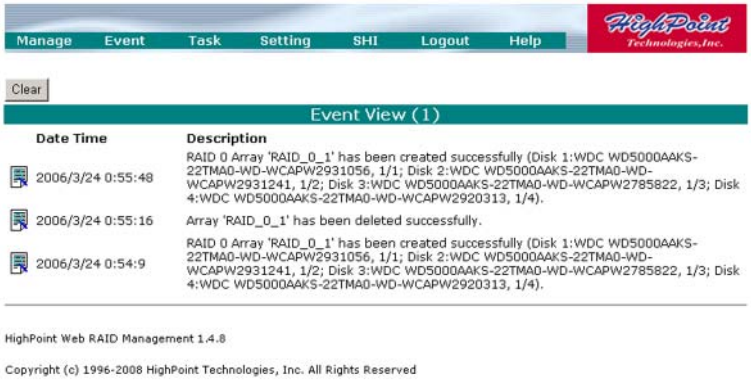
To remove a spare disk, select it from the *Spare Pool* list and click the **Remove Spare** button. This will remove the disk from the *Spare Pool* list.

6 - Managing Events and Tasks

The HighPoint Web RAID Management Software automatically logs all controller related events that have occurred (for all controllers/cards managed by the software). In addition you can configure E-mail Notification to receive information about these events (see Section 7 Settings)

View Events

To view logged events, Please select "**Event**" from the menu. The *Event Managemen*t page will be displayed.

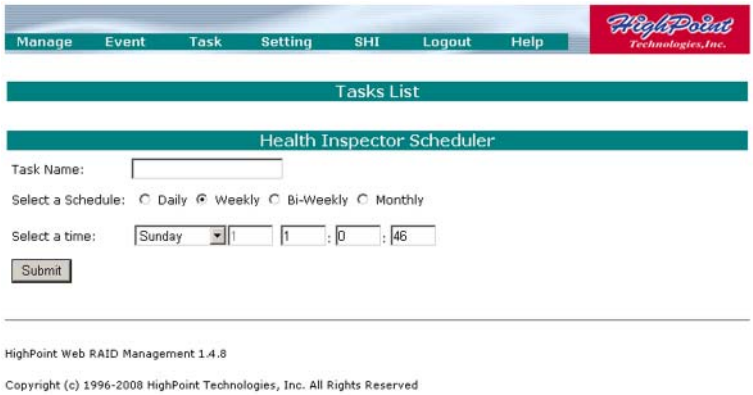

Manage
Event
Task
Setting
SHI
Logout
Help
Clear
Event View (1)
Date Time
Description
2006/3/24 0:55:48
RAID 0 Array 'RAID_0_1' has been created successfully (Disk 1:WDC WD5000AAKS-22TMA0-WD-WCAPW2931056, 1/1; Disk 2:WDC WD5000AAKS-22TMA0-WD-WCAPW2931241, 1/2; Disk 3:WDC WD5000AAKS-22TMA0-WD-WCAPW2785822, 1/3; Disk 4:WDC WD5000AAKS-22TMA0-WD-WCAPW2920313, 1/4).
2006/3/24 0:55:16
Array 'RAID_0_1' has been deleted successfully.
2006/3/24 0:54:9
RAID 0 Array 'RAID_0_1' has been created successfully (Disk 1:WDC WD5000AAKS-22TMA0-WD-WCAPW2931056, 1/1; Disk 2:WDC WD5000AAKS-22TMA0-WD-WCAPW2931241, 1/2; Disk 3:WDC WD5000AAKS-22TMA0-WD-WCAPW2785822, 1/3; Disk 4:WDC WD5000AAKS-22TMA0-WD-WCAPW2920313, 1/4).
HighPoint Web RAID Management 1.4.8
Copyright (c) 1996-2008 HighPoint Technologies, Inc. All Rights Reserved

Click the **Clear** button to clear the event log.

Managing Tasks

With HighPoint RAID Management Software, you can setup background rebuild and verify tasks to help maintain the integrity of your drives and data. The tasks can be scheduled periodically.

You can select menu "**Task**" to enter Task Management page.



Scheduling a Task

To add a task schedule:

1. Select the array that you want to verify or rebuild.
2. Enter a name for the task.

3. Configure the frequency for the task.
4. Check the **Submit** button.

Delete a Scheduled Task

To delete a task schedule:

1. Select a task from the Tasks List.
2. Click the Delete button.

7 - Settings

Select the "**Settings**" option to access *Settings* page.

Enable Audible Alarm

This setting enables and disables the RocketRAID host adapter's alarm.

Listening Port

Change Listening Port

This is the TCP port number utilized by the HighPoint RAID Management Service in

order to communicate with the management console and web browser software.

When you connect to the service, the port value you enter must be in accordance with the system port value on the service. The default value is 7402.

Enter a new port number and click the "**Change Port"** button to change the listening port.

Restrict to localhost access

If this option is selected, the HPT Web RAID Management Service will refuse any Remote Access request. Please connect to the local machine by entering "localhost" in the URL bar."

Change Password

This setting allows you to alter the default password (when logging on).

Enter a new password and click the "**Change Password"** button to change the current user's password.

Enabling E-mail notification:

To configure E-mail notification:

1. Select the "**Enable Event Notification**" option.
2. Enter the appropriate information for the SMTP server.
3. Click the "**Change Setting**" button.

Note: Your SMTP server may require user authentication – enter the appropriate password and username as required.

To add a Recipient:

1. Enter the necessary information for the desired recipient.

2. Click the **Add** button.

To test E-mail notification:

1. Enter the necessary information for the recipient.
2. Click the **Test** button.

Chapter 6
Linux Driver Support

Contents of this Chapter:

Fedora Linux installation Overview

Red Hat Overview

SuSE Linux Enterprise Server (SLES) installation Overview

1 - Overview

The purpose of this document is to provide clear instructions on how to install and use RocketRAID Controller on Fedora Linux system.

2 - Installing Fedora Linux on RR2644 controller

If you would like to install Fedora Linux onto drives attached to RR2644 controller, please perform the following operations:

Step 1 Prepare Your Hardware for Installation

After you attach your hard disks to RR2644 controller, you can use RR2644 BIOS Setting Utility to configure your hard disks as RAID arrays, or just use them as single disks.

Before installation, you must remove all the disk drives, which are not physically attached to RR2644 controller, from your system.

Note: *If you have other SCSI adapters installed, you must make sure the RR2644 controller BIOS will be loaded firstly. If not, try to move it to another PCI slot. Otherwise you may be unable to boot up your system.*

Step 2 Check System BIOS Settings

In your system BIOS SETUP menu, change **Boot Sequence** in such a way that the system will first boot from floppy or CDROM, and then from SCSI. Refer to your BIOS manual to see how to set boot sequence.

If your BIOS settings do not support such a boot sequence, you can first set it to boot from floppy or CDROM. After you finish installation, set SCSI as the first boot device to boot up the system.

Step 3 Prepare the Driver Diskette

Driver is contained in a floppy diskette image file, you can get it from our web site for free.

On a DOS or Windows system, you can make the Fedora driver diskette using

rawrite.exe. It can be found on the Fedora Linux CD (under /dosutils). Just run it under a command window and follow its prompt.

On a Linux system, you can use the "dd" command to make the boot diskette. Insert a floppy disk into the floppy drive and type the command (example):

 # dd if=rr2644-fedora-8.img of=/dev/fd0

Note:*If the floppy diskette is inserted into an external USB floppy controller and the device name in the linux system is* ***sda****, then:*

 # dd if=rr2644-fedora-8.img of=/dev/sda

In the following document, we assume the driver diskette is inserted into the on-board's floppy controller and the device name is ***fd0****.*

If the driver diskette is inserted into the external USB floppy controller, then you should replace the ***fd0*** *with the device name of the USB floppy controller.*

Step 4 Prepare the Driver Diskette

Installation steps for Fedora 8

1. Start installing Fedora Linux by booting from the installation DVD.
2. On "**Welcome to Fedora"** installation screen, press "**ESC**", then a prompted label "**boot:**" will appear at the top of the screen. Type in "**linux dd**" (without quotation mark) and then press **Enter**.
3. When prompted "**Do you have a driver disk?"** Select "**Yes**". When prompted "**Insert your driver disk and press OK to continue**", insert the driver diskette in the floppy drive and then select "**OK**". The system will load RR2644 driver automatically. When prompted "**Do you wish to load any more driver disks?"** Select "**No**".
4. Continue the installation as usual. You can refer to Fedora Linux installation guide. Make sure you have finished the next step before system reboot.
5. When installation finishes and prompts you to reboot the system, press "**CRL+ALT+F2**" to the shell and type the following commands:
   # chroot /mnt/sysimage
   # mount /dev/fd0 /mnt

 # sh /mnt/fedora-install-step2.sh
 # umount /dev/fd0
 # exit
Then switch back to console 1 and finish the installation.

Installation steps for Fedora 7

6. Start installing Fedora Linux by booting from the installation DVD.
7. On "**Welcome to Fedora"** installation screen, press "**ESC**", then a prompted label "**boot:**" will appear at the top of the screen. Type in "**linux dd**" (without quotation mark) and then press **Enter**.
8. When prompted "**Do you have a driver disk?"** Select "**Yes**". When prompted "**Insert your driver disk and press OK to continue**", insert the driver diskette in the floppy drive and then select "**OK**". The system will load RR2644 driver automatically. When prompted "**Do you wish to load any more driver disks?"** Select "**No**".
9. When prompted for an update disk source, select **fd0**. The installer will read updates from the driver floppy.
10. Continue the installation as usual. **Do not remove the floppy diskette** until installation completed.

Installation steps for Fedora Core 5

1. Start installing Fedora Linux by booting from the installation CD.
2. On "**Welcome to Fedora Linux**" installation screen, a prompted label "**boot:**" will appear at the bottom of the screen. Type in "**linux dd updates**" (without quotation mark) and then press **Enter**.
3. When prompted "**Do you have a driver disk?**". Select "**Yes**". When prompted "**Insert your driver disk and press OK to continue**", insert the driver diskette in the floppy drive and then select "**OK**". The system will
4. When prompted for an update disk source, select **fd0**. The installer will read updates from the driver floppy.
5. Continue the installation as usual. **Do not remove the floppy diskette** until installation completed.

Installation steps for Fedora Core 1 & Core 3 & Core 4 & Core 6

1. Start installing Fedora Linux by booting from the installation CD.
2. On "**Welcome to Fedora Linux**" installation screen, a prompted label "**boot:**" will appear at the bottom of the screen. Type in "**linux dd**" (without quotation mark) and then press **Enter**.
3. When prompted "**Do you have a driver disk?**". Select "**Yes**". When prompted "**Insert your driver disk and press OK to continue**", insert the driver diskette in the floppy drive and then select "**OK**".
4. Now the system will load RR2644 driver automatically.
5. Continue the installation as usual.

Installation steps for Fedora Core 2

1. Start installing Fedora Linux by booting from the installation CD.
2. On "**Welcome to Fedora Linux**" installation screen, a prompted label "**boot:**" will appear at the bottom of the screen. Just press **Enter**.
3. When prompted the warning "**No hard drives have been found"**, press "**ALT+F2**" to switch the shell on console 2. Insert the driver diskette into floppy drive and type the following commands:

```
# mkdir /dd
# mount /dev/fd0 /dd
# sh /dd/fedora-install-step1.sh
# umount /dev/fd0
```

Then press **"ALT+F1"** to switch back to installation screen and select **"No"** to continue.

4. Continue the installation as usual. You can refer to Fedora Linux installation guide. Make sure you have finished the next step before system reboot.
5. When installation finishes and prompts you to reboot the system, press "**CRL+ALT+F2**" to the shell and type the following commands:

```
# chroot /mnt/sysimage
# mount /dev/fd0 /mnt
# sh /mnt/fedora-install-step2.sh
# umount /dev/fd0
```

 # exit

Then switch back to console 1 and finish the installation.

3 - Installing RR2644 driver on an Existing System

Note: *If you use a SCSI adapter to boot your system, you must make sure the RR2644 controller BIOS will be loaded after that adapter's BIOS. If not, try to move it to another PCI slot. Otherwise you may be unable to boot up your system.*

Step 1 Obtain the Driver Module

You can extract the module file from the file modules.cgz on the driver disk. Using the following commands:

 # mount /dev/fd0

 # cd /tmp

 # gzip -dc /mnt/floppy/modules.cgz | cpio -idumv

Driver modules for all supported kernel versions will be extracted. You can find the driver module for your running kernel under the directory that matches your kernel version.

Step 2 Test the Driver Module

You can test out the module to ensure that it works for your system by changing working directory to the location where rr2644.ko resides and typing in the command "**insmod rr2644.ko**". If you are using a distribution with 2.4 kernel it should be "**insmod rr2644.o**".

Sometimes insmod will report "**unresolved symbols**" when you attempt to load the module. This can be caused by two ways:

1. You haven't loaded the SCSI module before loading rr2644.ko. Try to load SCSI modules first.

   E.g. **# modprobe scsi_mod**

   # modprobe sd_mod

   # insmod ./rr2644.ko

2. You are using a kernel that is build off a different configuration with the driver. In this case the precompiled drivers cannot be used. You can build a driver for your kernel using Open Source package for RocketRAID controller.

To ensure the module has been loaded successfully, you can check the driver status by typing in the command "**cat /proc/scsi/rr2644/x**",where **x** is the filename you found under /proc/scsi/rr2644/. You should see the driver banner and a list of attached drives. You can now access the drives as a SCSI device (the first device is /dev/sda, then /dev/sdb, etc.).

Example: You have configured a RAID 5 array using 4 disks. It will be registered to system as device **/dev/sda**. You can use "**fdisk /dev/sda**" to create a partition on it, which will be **/dev/sda1**, and use "**mkfs /dev/sda1**" to setup a file system on the partition. Then you can mount **/dev/sda1** to somewhere to access it.

Step 3 Configure System to Automatically Load the Driver

Most likely, you will not want to type in "**insmod rr2644.ko**" each time you boot up the system. Therefore you must install the module and tell the system about it. To install the module, type in the following commands (first change directory to where the proper rr2644.ko locates):

```
# cp rr2644.ko /lib/modules/`uname –r`/kernel/drivers/scsi
#depmod
```

Then you should inform the system load the module when system boots up with the following command:

```
# echo "modprobe rr2644" > /etc/init.d/hptdriver
# chmod 755 /etc/init.d/hptdriver
# ln –sf /etc/init.d/hptdriver /etc/rc.d/rc3.d/S01hptdriver
# ln –sf /etc/init.d/hptdriver /etc/rc.d/rc4.d/S01hptdriver
# ln –sf /etc/init.d/hptdriver /etc/rc.d/rc5.d/S01hptdriver
```

Step 4 Configure System to Mount Volumes when Startup

Now you can inform the system to automatically mount the array by modifying the file /etc/fstab. E.g. you can add the following line to tell the system to mount /dev/sda1 to location /mnt/raid after startup:

/dev/sda1 /mnt/raid ext3 defaults 0 0

4 - Monitoring the Driver

Once the driver is running, you can monitor it through the Linux proc file system support. There is a special file under /proc/scsi/rr2644/.

Note:*The file name is the SCSI host number allocated by OS. If you have no other SCSI cards installed, it will be 0. In the following sections, we will use x to represent this number.*

Checking Devices Status

Using the following command to show driver status:

 # cat /proc/scsi/rr2644/x

This command will show the driver version number, physical device list and logical device list.

5 - Updating the Driver

1. If the original driver is installed in the system initrd file (e.g. when OS is installed to RR2644 controller), you can update the driver as below:

   # cp rr2644.ko /lib/modules/`uname –r`/updates/
   # mkinitrd `uname –r`
   For FC2, the commands should be
   # cp rr2644.ko /lib/modules/`uname –r`/kernel/drivers/scsi/
   # mkinitrd –-preload scsi_mod –-preload sd_mod –-with=rr2644 /

boot/initrd-`uname –r`.img `uname –r`

It's recommended to backup the original initrd file before you update the driver.

2. If the original driver is installed in the /lib/modules/`**uname –r**`/kernel/drivers/scsi/ directory, and load it by the script file (e.g. /etc/init.d/hptdriver) during the init process, please replace it with the new driver (rr2644.o or rr2644.ko)

6 - Installing RAID Management Software

HighPoint RAID Management Software is used to configure and keep track of your hard disks and RAID arrays attached to RR2644 controller. Installation of the management software is optional but recommended.

Please refer to HighPoint RAID Management Software documents about more information.

7 - Uninstalling

You can only uninstall the driver when your system is not booting from devices attached to RR2644 controller. Just remove the lines you added to /etc/fstab, and remove the file files you created in the /etc/init.d.

1 - Overview

The purpose of this document is to provide clear instructions on how to install and use RR2644 Controller on Red Hat Enterprise/CentOS Linux system.

2 - Installing Red Hat Enterprise/CentOS Linux on RR2644 controller

If you would like to install Red Hat Enterprise/CentOS Linux onto drives attached to RR2644 controller, please perform the following operations:

Step 1 Prepare Your Hardware for Installation

After you attach your hard disks to RR2644 controller, you can use RR2644 BIOS Setting Utility to configure your hard disks as RAID arrays, or just use them as single disks.

Before installation, you must remove all the disk drives, which are not physically attached to RR2644 controller, from your system.

Note: *If you have other SCSI adapters installed, you must make sure the RR2644 controller BIOS will be loaded firstly. If not, try to move it to another PCI slot. Otherwise you may be unable to boot up your system.*

Step 2 Check System BIOS Settings

In your system BIOS SETUP menu, change **Boot Sequence** in such a way that the system will first boot from floppy or CDROM, and then from SCSI. Refer to your BIOS manual to see how to set boot sequence.

If your BIOS settings do not support such a boot sequence, you can first set it to boot from floppy or CDROM. After you finish installation, set SCSI as the first boot device to boot up the system.

Step 3 Prepare the Driver Diskette

Driver is provided in floppy diskette image file format.

On a DOS or Windows system, you can make the Red Hat driver diskette using

rawrite.exe. It can be found on the Red Hat Enterprise/CentOS Linux CD (under / dosutils). Just run it under a command window and follow its prompt.

On a Linux system, you can use the "dd" command to make the boot diskette. Insert a floppy disk into the floppy drive and type the command (amd64 driver for example):

 # dd if=rr2644-rhel5u1.img of=/dev/fd0

Note: If the floppy diskette is inserted into an external USB floppy controller and the device name in the linux system is **sda**, then:

 # dd if=rr2644-rhel-5u1.img of=/dev/sda

In the following document, we assume the driver diskette is inserted into the on-board's floppy controller and the device name is **fd0**.

If the driver diskette is inserted into the external USB floppy controller, then you should replace the **fd0** with the device name of the USB floppy controller.

Step 4 Install Red Hat Enterprise/CentOS Linux

Installation steps for other RedHat Enterprise/CentOS Linux

1. Start installing Red Hat Enterprise/CentOS Linux by booting from the installation CD.
2. On "**Welcome to Red Hat Enterprise/CentOS Linux**" installation screen, a prompted label "**boot:**" will appear at the bottom of the screen:

For RedHat Enterprise/CentOS Linux 3, type in "**expert text**" (without quotation mark);

For RedHat Enterprise/CentOS Linux 4.x, type in "**linux dd**" (without quotation mark), then press **Enter**..

For RedHat Enterprise/CentOS Linux 5.x, type in "**linux dd**" (without quotation mark), then press **Enter**..

3. When prompted "**Do you have a driver disk?**". Select "**Yes**". When prompted "**Insert your driver disk and press OK to continue**", insert the driver diskette in the floppy drive and then select "**OK**".
4. The system will load RR2644 driver automatically. Continue the installation as normal.
5. When asked "**where do you want to install the boot loader?** " in the "Boot Loader Configuration" dialog, you must select "**Master Boot Record (MBR)**" to make your `system be able to boot RR2644 controller.`
6. Continue the installation as normal. You can refer to Red Hat Enterprise/CentOS Linux installation guide.

Note:

1. *The system device mapping order is the same as the order shown in RR2644 BIOS Setting Utility.*
2. *On some system the LILO boot loader may be installed incorrectly unless you specify BIOS parameters in /etc/lilo.conf. During installation, when prompted "Would you like to create a boot disk for your system?", switch to console 2 by pressing <Ctl>+<Alt>+F2. Then use the following command:*

   # chroot /mnt/sysimage
   # vi /etc/lilo.conf
   Add two lines under the line "boot=/dev/sda":
   disk=/dev/sda
   bios=0x80
   # /sbin/lilo
   Press <Ctl>+<Alt>+F1 to continue the installation.

3 - Installing RR2644 driver on an Existing System

Note: *If you use a SCSI adapter to boot your system, you must make sure the RR2644 controller BIOS will be loaded after that adapter's BIOS. If not, try to move it to another PCI slot. Otherwise you may be unable to boot up your system.*

Step 1 Obtain the Driver Module

You can extract the module file from the file modules.cgz on the driver disk. Using the following commands:

 # mount /dev/fd0
 # cd /tmp
 # gzip -dc /mnt/floppy/modules.cgz | cpio -idumv

Driver modules for all supported kernel versions will be extracted. You can find the driver module for your running kernel under the directory that matches your kernel version (/tmp/`**uname –r**`/rr2644.ko)

Step 2 Test the Driver Module

You can test out the module to ensure that it works for your system by changing working directory to the location where rr2644.ko resides and typing in the command "**insmod rr2644.ko**". If you are using a distribution with 2.4 kernel, driver file should be **rr2644.o**.

Sometimes insmod will report "**unresolved symbols**" when you attempt to load the module. This can be caused by two ways:

1. You haven't loaded the SCSI module before loading rr2644.ko. Try to load SCSI modules first.

   E.g. # **modprobe sd_mod**

   # **insmod rr2644.ko**

2. You are using a kernel that is build off a different configuration with the driver. In this case the precompiled drivers cannot be used. You can build a driver for your kernel using OpenBuild package for RR2644 controller.

To ensure the module has been loaded successfully, you can check the driver status by typing in the command "**cat /proc/scsi/rr2644/x**", where **x** is the filename you found under /proc/scsi/rr2644/. You should see the driver banner and a list of attached drives. You can now access the drives as a SCSI device (the first device is /dev/sda, then /dev/sdb, etc.).

Example: You have configured a RAID 0 array using 2 disks. It will be registered to system as device **/dev/sda**. You can use "**fdisk /dev/sda**" to create a partition on it, which will be **/dev/sda1**, and use "**mkfs /dev/sda1**" to setup a file system on the partition. Then you can mount **/dev/sda1** to somewhere to access it.

Step 3 Configure System to Automatically Load the Driver

Most likely, you will not want to type in "**insmod rr2644.ko**" each time you boot up the system. Therefore you must install the module and tell the system about it. To install the module, type in the following commands (first change directory to where the proper rr2644.ko locates):

```
#install –d /lib/modules/`uname –r`/kernel/drivers/scsi
#install –c rr2644.ko /lib/modules/`uname –r`/kernel/drivers/scsi
#depmod
```

Then you should inform the system load the module when system boots up with the following command:

```
#iecho "modprobe rr2644" > /etc/init.d/hptdriver
#chmod 755 /etc/init.d/hptdriver
#ln –sf /etc/init.d/hptdriver /etc/rc.d/rc3.d/S01hptdriver
#ln –sf /etc/init.d/hptdriver /etc/rc.d/rc4.d/S01hptdriver
#ln –sf /etc/init.d/hptdriver /etc/rc.d/rc5.d/S01hptdriver
```

Step 4 Configure System to Mount Volumes when Startup

Now you can inform the system to automatically mount the array by modifying the file /etc/fstab. E.g. you can add the following line to tell the system to mount /dev/sda1 to location /mnt/raid after startup:

/dev/sda1 /mnt/raid ext2 defaults 0 0

4 - Monitoring the Driver

Once the driver is running, you can monitor it through the Linux proc file system support. There is a special file under /proc/scsi/rr2644/. Through this file you can view driver status and send control commands to the driver.

Note: *The file name is the SCSI host number allocated by OS. If you have no other SCSI cards installed, it will be 0. In the following sections, we will use x to represent this number.*

Checking Devices Status

Using the following command to show driver status:

cat /proc/scsi/rr2644/x

This command will show the driver version number, physical device list and logical device list.

5 - Updating the Driver

First obtain the new driver module file rr2644.ko from the driver image. Refer to the previous section "**Obtain the Driver Module**". In the following steps, we assume you have copied it to /tmp/**rr2644.ko**, and your initrd file is **/boot/initrd-`uname –r`.img**

1. If you are not booting from disks attached to RR2644 controller, you can update the driver just by reinstalling it following the previous section, "**Install RR2644 driver on an Existing System**". Overwrite the driver file in the directory "**/lib/modules/`uname –r`/kernel/drivers/scsi/".**

   #cp –f /tmp/rr2644.ko /lib/modules/`uname –r`/kernel/drivers/scsi/

2. If you are using a system installed to RR2644 controller, you can update the driver file in the directory "**/lib/modules/`uname –r`/updates/",** then update the initrd file.

   #cp –f /tmp/rr2644.ko /lib/modules/`uname –r`/updates/
   #mkinitrd initrd-`uname –r`.img `uname –r`

If you are using lilo to boot your system, use "**lilo**" to reinstall the RAM disk:

#lilo

6 - Installing RAID Management Software

HighPoint RAID Management Software is used to configure and keep track of your hard disks and RAID arrays attached to RR2644 controller. Installation of the management software is optional but recommended.

To configure HighPoint RAID Management Software to work with rr2644 driver, you should setup /etc/hptcfg to be the driver name:

#echo rr2644 > /etc/hptcfg

Please refer to HighPoint RAID Management Software documents for more information.

7 - Uninstalling

You can only uninstall the driver when your system is not booting from devices attached to RR2644 controller. Just remove the lines you added to /etc/fstab, and remove the file files you created in the /etc/init.d.

1 - Overview

The purpose of this document is to provide clear instructions on how to install and use Rocket RAID 2644 Controller on SuSE Linux system.

2 - Installing SuSE Linux on RR2644 Controller

If you would like to install SuSE Linux onto drives attached to RR2644 controller, please perform the following operations:

Step 1 Prepare Your Hardware for Installation

After you attach your hard disks to RR2644 controller, you can use RR2644 BIOS Setting Utility to configure your hard disks as RAID arrays, or just use them as single disks.

Before installation, you must remove all the disk drives, which are not physically attached to RR2644 controller, from your system. command prompt window, and follow the directions it provides.

Note: *If you have other SCSI adapters installed, you must make sure the RR2644 controller BIOS will be loaded firstly. If not, try to move it to another PCI slot. Otherwise you may be unable to boot up your system.*

Step 2 Check System BIOS Settings

In your system BIOS SETUP menu, change **Boot Sequence** in such a way that the system will first boot from floppy or CDROM, and then from SCSI. Refer to your BIOS manual to see how to set boot sequence.

If your BIOS settings do not support such a boot sequence, you can first set it to boot from floppy or CDROM. After you finish installation, set SCSI as the first boot device to boot up the system.

Step 3 Prepare the Driver Diskette

The driver diskette is provided as an image file (susedd.img).

On a DOS or Windows system, you can make the driver diskette using rawrite.exe. It can be found on the SuSE Linux CD (under /dosutils). Just run it under a command window and follow its prompt.

On a Linux system, you can use the "dd" command to make the driver diskette. Insert a floppy disk into the floppy drive and type the command:

 # dd if=rr2644-suse-10.3.img of=/dev/fd0

Step 4 Install SuSE Linux

1. Start installing by booting from SuSE installation CD.
2. When CD boots, press the Alt or F3 for Driver Disk and select "Installation" option.
   For SuSE9.0, press F3;
   For SuSE Linux 9.1/9.2/10.3, press F6;
   For SuSE 9.3/10.0/OpenSuSE 10.2, press F5;
   For SuSE 10.1, press F3 for more options then press F5;
   `For OpenSuSE 10.3(i386) press F6;`
   For OpenSUSE 10.3 press F6 and boot with option "insmod=floppy";(without quotation mark) .
3. Insert the Driver Disk when it displays "Please insert the Driver Update floppy".

Note: *For SuSE 9.1 x86_64, the setup kernel doesn't include a floppy controller driver so the floppy drive is not accessible. You have to use a USB floppy to load the driver.*

4. For SuSE 8.1 SMP Installation type "**acpi=off**" and then press "**enter**"; For SuSE 8.2 Installation select "**Installation**" and then press "**enter**"; For others press "**enter**".
5. For SuSE 8.x/9.x, when Diver Update Menu pop-up, press "Back" to continue installation.
   For SuSE 10.x, when Diver Update Menu pop-up, insert the Driver Update floppy and press "Ok" to update the driver, then press "Back" to continue installation.
6. Continue the installation as normal. You can refer to SuSE Linux documents about OS installation.

Additional Installation Notes:

1. The system device mapping order is the same as the order shown in RR2644 BIOS Setting Utility. If you have no other SCSI adapters installed, the device marked as

"BOOT" or "HDD0" will be /dev/sda, "HDD1" will be /dev/sdb, "HDD2" will be /dev/sdc, etc. When creating mount points, you must mount /boot on /dev sda.

2. For SuSE 8.2, if you choose GRUB as boot loader, it's recommended to create a separate partition for /boot. Otherwise the GRUB installation may fail.
3. The driver may work incorrectly on some specific motherboard, such as DFI77B VIA KT400. You can type "**acpi=off**" when a prompted label "**boot:**" appears. When "**Error occurred while installing GRUB**" dialog appears, you can change boot loader from GRUB to LILO.
4. Since SuSE9.1 boot installation kernel does not load the driver for common floppy controller during installation, so it is necessary to install a USB floppy drive to load additional driver.
4. Installing SuSE10.x by loading driver from USB floppy controller, because the device mapping order will not be the same as the installation time, please edit the boot loader configuration file to boot the system normally.For example: During installation time, USB disk is /dev/sda, RAID disk is /dev/sdb, so OS is installed on the /dev/sdb. But after installation completion, RAID disk is changed to /dev/sda, please modify the boot loader configure file and /etc/fstab to boot from /dev/sda.

3 - Installing RR2644 Driver on an Existing System

If you are currently running Linux and would like to access drives or arrays attached to the Rocket RAID 2644 controller, you can perform the following steps.

Note:

1. *If you use a SCSI adapter to boot your system, you must make sure the RR2644 controller BIOS will be loaded after that adapter's BIOS. If not, try to move it to another PCI slot. Otherwise you may be unable to boot up your system.*
2. *The driver may work incorrectly on some specific motherboard, such as DFI77B KT400. You can add "**acpi=off**" kernel parameter in the /boot/grub/menu.lst:*

   kernel (hd0,1)/vmlinuz root=/dev/hda1 **acpi=off**

   initrd (hd0,1)/initrd

Step 1 Install the Driver Module

The driver modules are packed in file /linux/suse /[*arch*]-[*version*]/install/update.tar.gz on the driver diskette. The following example shows how to extract the driver modules for SuSE 10.3 from driver diskette:

 # mount /dev/fd0 /mnt/floppy

 # cd /

 # tar xfz /mnt/floppy/linux/suse/i386-10.3/install/update.tar.gz

The driver modules will be extracted to directory /lib/modules/[*kernel-ver*]/kernel/drivers/scsi/.

Step 2 Test the Driver Module

You can test out the module to ensure that it works for your system by typing in the command "**insmod rr2644**".

Sometimes insmod will report "**unresolved symbols**" when you attempt to load the module. This can be caused by two ways:

1. The SCSI module is not loaded in kernel. Try to load SCSI modules first.
   E.g. **# insmod scsi_mod**
   # insmod sd_mod
   # insmod rr2644
2. You are using a kernel that is build off a different configuration with the driver. In this case the precompiled drivers cannot be used. You can build a driver for your kernel using the OpenBuild package for RocketRAID 2644 controller.

To ensure the module has been loaded successfully, you can check the driver status by typing in the command "cat /proc/scsi/rr2644/x", where x is the filename you found under /proc/scsi/rr2644/. You should see the driver banner and a list of attached drives. You can now access the drives as a SCSI device (the first device is /dev/sda, then /dev/sdb, etc.).

Example: You have configured a RAID 5 array using 4 disks. It will be registered to system as device **/dev/sda**. You can use "**fdisk /dev/sda**" to create a partition on it, which will be **/dev/sda1**, and use "**mkfs /dev/sda1**" to setup a file system on the partition. Then you can mount **/dev/sda1** to somewhere to access it.

Step 3 Configure System to Automatically Load the Driver

Most likely, you will not want to type in "**insmod rr2644**" each time you boot up the system. You can add the driver to the initial RAM disk image to load the driver at boot time:

1. Edit the file "/etc/sysconfig/kernel", and add the rr2644 module to the line INITRD_MODULES=…,e.g

   Example:

   INITRD_MODULES="reiserfs rr2644"

2. Run the "depmod" command to update the module configuration:

   # depmod

3. Next, run the "mkinitrd" command to update the initrd file:

   # mkinitrd

4. If you are using the lilo boot loader, run lilo again:

   # lilo

Step 4 Configure System to Mount Volumes when Startup

Now you can inform the system to automatically mount the array by modifying the file /etc/fstab. E.g. You can add the following line to tell the system to mount /dev/sda1 to location /mnt/raid after startup:

/dev/sda1 /mnt/raid ext2 defaults 0 0

4 - Monitoring the Driver

Once the driver is running, you can monitor it through the Linux proc file system support. There is a special file under /proc/scsi/rr2644/. Through this file you can view driver status and send control commands to the driver.

Note: *The file name is the SCSI host number allocated by OS. If you have no other SCSI cards installed, it will be 0. In the following sections, we will use x to represent this number.*

Checking Devices Status

Using the following command to show driver status:

 # cat /proc/scsi/rr2644/x

This command will show the driver version number, physical device list and logical device list.

5 - Updating the Driver

To update the driver, simply reinstall the driver following the steps in previous section, " **Install RR2644 Driver on an Existing System** ".

Replace the driver module rr2644.ko in the /lib/modules/[*kernel-ver*]/kernel/drivers/scsi/. If the driver is loaded in initrd (e.g. when system is installed on the controller), you need to run mkinitrd to update the initrd file. Also, if you are using lilo boot loader, you need to run lilo again.

6 - Installing RAID Management Software

HighPoint RAID Management Software is used to configure and keep track of your hard disks and RAID arrays attached to RocketRAID controller. Installation of the management software is optional but recommended.

To configure HighPoint RAID Management Software to work with RocketRAID controller driver, you should setup /etc/hptcfg to be the driver name:

 # echo rr2644 > /etc/hptcfg

Please refer to HighPoint RAID Management Software documents for more information.

7 - Uninstalling

You can only uninstall the driver when your system is not booting from devices attached to RR2644 controller. Just remove the the added before in the file rr2644 from the file /etc/sysconfig/kerne and /etc/fstab, then, then the new initrd file.

Chapter 7
FreeBSD Driver Support

Contents of this Chapter:

1 - Overview
2 - Installing FreeBSD on RocketRAID 2644 Controller
3 - Installing the RocketRAID 2644X4 Driver on an Existing System
4 - Updating the Driver
5 - Installing RAID Management Software
6 - Uninstalling the Driver

1 - Overview

The purpose of this document is to provide clear instructions on how to install and use RocketRAID 2644 Controller on a FreeBSD system.

2 - Installing FreeBSD on RocketRAID 2644 Controller

If you would like to install FreeBSD onto drives attached to RocketRAID 2644 controller, please perform the following operations:

Step 1 Prepare Your Hardware for Installation

After you attach your hard disks to RR2644 controller, you can use RR2644 BIOS Setting Utility to configure your hard disks as RAID arrays, or just use them as single disks.

Note: *If you have other SCSI adapters installed, you must make sure the RR2644 controller BIOS will be loaded firstly. If not, try to move it to another PCI slot. Otherwise you may be unable to boot up your system.*

Step 2 Check System BIOS Settings

In your system BIOS SETUP menu, change **Boot Sequence** in such a way that the system will first boot from CDROM, next from and then from floppy drive, and then from SCSI. Refer to your BIOS manual to see how to set boot sequence.

If your BIOS settings do not support such a boot sequence, you can first set it to boot from CDROM. After you finish installation, set SCSI as the first boot device to boot up the system.

Step 3 Prepare the Driver Diskette

If you are installing FreeBSD, you must prepare a driver disk for RR2644 before installation.

First obtain the driver diskette image file, freebsd.img.

On a DOS or Windows system, you can make the boot diskette using rawrite.exe. It can be found on the FreeBSD CD (under \tools). Just run it under a command window and follow its prompt.

On a FreeBSD system, you can use the “dd” command to make the driver diskette. For example, Insert a floppy disk into the floppy drive and type the following command if

you are installing FreeBSD 7.0 versions:

 # dd if=freebsd_7.0.img of=/dev/fd0

Step 4 Install FreeBSD

1. Start installing the FreeBSD by booting from installation CD.
2. If you are installing FreeBSD 5.0 or earlier versions, skip this step. When "**Welcome to FreeBSD**" screen appears, select "**6**".
3. When "**Hit [enter] to boot immediately or any other key for command prompt**" screen appears, press SPACE key to stop loader from autobooting.

```
BTX loader 1.00 BTX version is 1.01
Console: internal video/keyboard
BIOS driver A: is disk0
BIOS driver B: is disk1
BIOS driver C: is disk2
BIOS 636kB/74512kB available memory
FreeBSD/i386 bootstrap loader, Revision 0.8
(mailto:jkh@narf.osd.bsdi.com, Sat Apr 21 08:46:
19 GMT 2001)
-
Hit [Enter] to boot immediately, or any other
key for command prompt.
Booting [kernel] in 9 seconds¡-
<-press SPACE key
```

A prompted label "**ok**" will appear at the bottom of the screen.

4. Insert RR2644 driver diskette into floppy drive now. Type in "**load diskx:rr2644-x.x**" (without quotation mark) and then press **enter**.

```
for FreeBSD 4.3-RELEASE
  ok load kernel
  ok load disk1:rr2644-4.3.ko

for FreeBSD 4.4-RELEASE
  ok load kernel
  ok load disk1:rr2644-4.4.ko
```

```
for FreeBSD 4.5-RELEASE
  ok load disk1:rr2644-4.5.ko

for FreeBSD 4.6.2-RELEASE
  ok load disk1:rr2644-4.6.2.ko

for FreeBSD 4.7-RELEASE
  ok load disk1:rr2644-4.7.ko

for FreeBSD 4.8-RELEASE
  ok load disk1:rr2644-4.8.ko

for FreeBSD 4.9-RELEASE
  ok load disk1:rr2644-4.9.ko

for FreeBSD 4.10-RELEASE
  ok load disk1:rr2644-4.10.ko

for FreeBSD 4.11-RELEASE
  ok load disk1:rr2644-4.11.ko

for FreeBSD 5.0-RELEASE
  ok load disk0:rr2644-5.0.ko

for FreeBSD 5.1-RELEASE
  ok load disk0:rr2644-5.1.ko

for FreeBSD 5.2.1-RELEASE
  ok load disk0:rr2644-5.2.1.ko

for FreeBSD 5.3-RELEASE
  ok load disk0:rr2644-5.3.ko
```

```
for FreeBSD 5.4-RELEASE
  ok load disk0:rr2644-5.4.ko

for FreeBSD 5.3-AMD64-RELEASE
  ok load disk0:rr2644-5.3-amd64.ko

for FreeBSD 5.4-AMD64-RELEASE
  ok load disk0:rr2644-5.4-amd64.ko

for FreeBSD 6.0-RELEASE
  ok load disk0:rr2644-6.0.ko

for FreeBSD 6.0-AMD64-RELEASE
  ok load disk0:rr2644-6.0-amd64.ko

for FreeBSD 6.1-RELEASE
  ok load disk0:rr2644-6.1.ko

for FreeBSD 6.1-AMD64-RELEASE
  ok load disk0:rr2644-6.1-amd64.ko

for FreeBSD 6.2-RELEASE
  ok load disk0:rr2644-6.1.ko

for FreeBSD 6.2-AMD64-RELEASE
  ok load disk0:rr2644-6.2-amd64.ko

for FreeBSD 6.3-RELEASE
  ok load disk0:rr2644-6.3.ko

for FreeBSD 6.3-AMD64-RELEASE
  ok load disk0:rr2644-6.3-amd64.ko
```

```
for FreeBSD 6.3-RELEASE
  ok load disk0:rr2644-6.3.ko

for FreeBSD 6.3-AMD64-RELEASE
  ok load disk0:rr2644-6.3-amd64.ko

for FreeBSD 7.0-RELEASE
  ok load disk0:rr2644-7.0.ko

for FreeBSD 7.0-AMD64-RELEASE
  ok load disk0:rr2644-7.0-amd64.ko
```

5. After the driver has been loaded, remove the floppy diskette from the floppy drive.
6. Type in "boot" and continue the installation as normal. You can refer to FreeBSD installation guide.

```
ok boot
```

Note: *On some systems with ACPI enabled, FreeBSD may not work. You can try to disable ACPI in system BIOS or type the command "**set hint.acpi.0.disabled="1"**" under boot prompt to solve the problem.*

7. Before exit install, an additional step must be taken to copy RR2644 driver module to system. On the driver disk, there is a setup script "**postinstall**" which will do this work for you. Before you reboot the system, press **Alt-F4** to the command shell and type the following commands:

   For common ISA floppy controller:

   ```
   # mount -o ro /dev/fd0 /mnt
   ```

   For USB floppy controller, we assume it is da0

   ```
   # mount -o ro /dev/da0 /mnt
   ```

   Then run script to do postinstall

   ```
   # sh /mnt/postinstall
   # umount /mnt
   ```

Then press **Alt-F1** to return to the setup screen and choose **[X Exit Install]** to finish.

Note: *On some systems the floppy may be inaccessible during installation. In this*

case, please remove the CD, reboot from the installed system and load the driver manually from floppy again when booting from controller. After system boots up you can run the postinstall script to install the driver.

3 - Installing RR2644 Driver on an Existing System

If you are currently running FreeBSD and would like to access drives or arrays attached to the RR2644 Controller, you can perform the following steps.

Step 1 Copy the Driver Module

If you have made freebsd drivers into a diskette, you can insert the driver diskette to floppy drive, then using the following commands to copy the driver module:

```
for FreeBSD 4.x:
  # mount -o ro /dev/fd0 /mnt
  # cp /mnt/rr2644-xxx.ko /modules/rr2644.ko
  # umount /mnt
for FreeBSD 5.x/6.x/7.x:
  # mount -o ro /dev/fd0 /mnt
  # cp/mnt/rr2644-xxx.ko /boot/kernel/rr2644.ko
  # umount /mnt
```

You can also extract the files from .img files directly, without using a floppy diskette:

```
For FreeBSD 4.x:
 # vnconfig vn0c rr2644-7.0.img
 # mount /dev/vn0c /mnt vnconfig vn0c rr2644-7.0.img
 # cp /mnt/rr2644-xxx.ko /modules/rr2644.ko
 # vnconfig -du vn0c myfilesystem mount=/mnt
For FreeBSD 5.x/6.x/7.x:
 # mdconfig -a -t vnode -f rr2644-7.0.img -u 0
 # mount /dev/md0 /mnt
 # cp /mnt/rr2644-xxx.ko /boot/kernel/rr2644.ko
 # umount /mnt
 # mdconfig -d -u md0
```

Step 2 Test the Driver Module

You can test out the module to ensure that it works for your system by load it during system booting.

If the module has been loaded successfully you should see the RR2644 banner and a display screen of the attached drives. You can now access the drives as a SCSI device (if you have no other SCSI device, the first device is /dev/da0, then /dev/da1, etc.).

Example:

```
F1 FreeBSD
Default: F1
>> FreeBSD/i386 BOOT
Default: 0:ad(0,a)/boot/loader
boot:
BTX loader 1.00 BTX version is 1.01
Console: internal video/keyboard
BIOS driver A: is disk0
BIOS driver C: is disk2
BIOS 636kB/74512kB available memory
FreeBSD/i386 bootstrap loader, Revision 0.8
(mailto:jkh@narf.osd.bsdi.com, Sat Apr 21 08:46:19 GMT
2001)
Loading /boot/defaults/loader.conf
/kernel text=0x24f1db data=0x3007ec+0x2062c -
<- For FreeBSD 5.1 and later: select "6" on "Welcome to
FreeBSD" screen.
Hit [Enter] to boot immediately, or any other key for
command prompt.
ooting [kernel] in 9 seconds¡-
B
<-press SPACE key
Type '?' for a list of commands, 'help' for more de-
tailed help.
ok load rr2644
/modules/rr2644.ko text=0xf571 data=0x2c8+0x254
ok autoboot
```

Note: *If you have configured a RAID 1/0 using 4 disks, it will be registered to system as device* ***/dev/da0****. You can use "****/stand/sysinstall****" to create partitions and disklabels (like da0s1e) on* ***da0****. Then you can create new filesystem using "****newfs / dev/da0s1e****". Now you can mount* ***/dev/da0s1e*** *to somewhere to access it.*

Step 3 Configure System to Automatically Load the Driver

Most likely, you will not want to type "load rr2644" each time you boot up the system.Therefore you must install the module and tell the system about it. To configure

system to automatically load the driver, type in the following commands:

```
# echo 'rr2644_load="YES"' >> /boot/defaults/loader.conf
```

This tells the loader to try loading the RR2644 module together with the kernel. Now, reboot the system. RR2644 module should be automatically loaded each time system start up.

Note: *If FreeBSD you installed is 4.x version, you should type the following command to configure your system:*

 # mknod /dev/rr2644 c 200 0

Then, please check whether node"**/dev/rr2644**"exists in /dev directory.

Step 4 Configure the System to Mount Volumes at Startup

Now you can inform the system to automatically mount the array by modifying the file /etc/fstab. E.g. You can add the following line to tell the system to mount /dev/da1s1e to location /mnt/hpt after startup:

/dev/da1s1e /mnt/hpt ufs rw 0 0

4 - Updating the Driver

To update the driver with a new version you simply reinstall the driver following the previous section, "Install the driver on an existing system".

5 - Installing RAID Management Software

HighPoint RAID Management Software is used to configure and keep track of your hard disks and RAID arrays attached to RR2644 controller. Installation of the management software is optional but recommended.

To configure HighPoint RAID Management Software to work with RR2644 driver, you should setup /etc/hptcfg to be the driver name:

 # echo rr2644 > /etc/hptcfg

Please refer to HighPoint RAID Management Software documents for more information.

6 - Uninstalling

You can only uninstall the driver when your system is not booting from devices attached to RR2644 controller. Just remove the line

rr2644_load=”YES”

in /boot/defaults/loader.conf, and then delete the driver module **/modules/rr2644.ko** or **/boot/kernel/rr2644.ko** .

Chapter 8
Mac OSX Driver

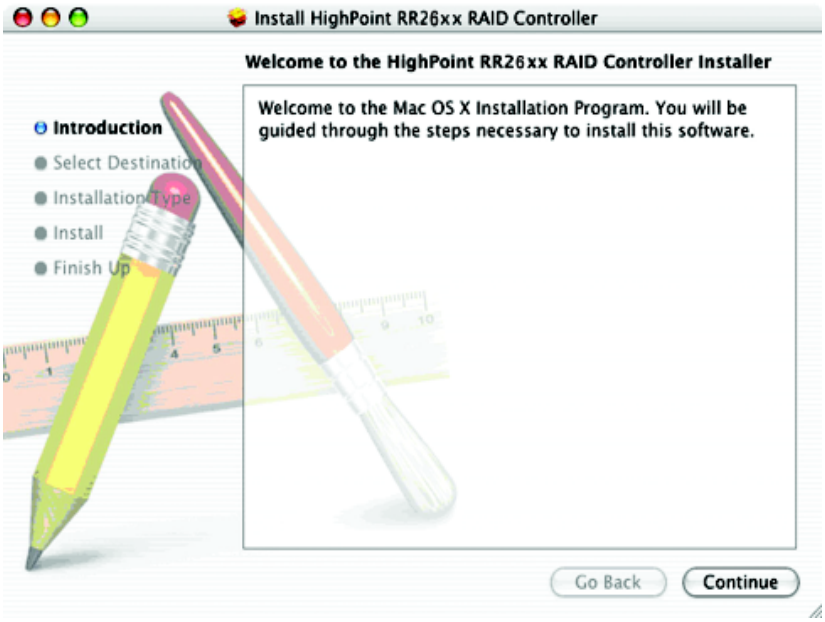
Contents of this Chapter:

Installing the driver and RAID utility

1 Installing the driver and RAID utility

Installing the package

1. Double click the package labeled "**rr2644-MacOSX-universal-vxxx.dmg**" to start the installation process *("xxx" refers to the revision of the driver)*. This will open the driver and software package.
2. Double click the **"rr2644-MacOSX-universal-vxxx.dmg"** file to start the installer:
3. When the Installer window opens, click the "**Continue**" button.


Install HighPoint RR26xx RAID Controller
Welcome to the HighPoint RR26xx RAID Controller Installer
Introduction
Select Destination
Installation Type
Install
Finish Up
Welcome to the Mac OS X Installation Program. You will be guided through the steps necessary to install this software.
Go Back
Continue

4. The installer will ask you to select a destination for the driver. Make sure to select the boot Volume - the driver must be installed to /System/Library/Extensions/ folder in order to function properly.
5. Click the "**Install**" button.
   You will be prompted: "clicking the install button will install a basic installation of the software package on your selected volume". Confirm the prompt to install the software package.

6. You will then be notified that a reboot is needed to install the software. Click "Continue Installation".
7. The driver will then be installed into the system. Click "Restart" to restart the system.

After the system restarts, you can use a web browser to configure the controller and setup RAID arrays. Use the MacOSX Disk Utility to create partitions the RAID arrays.

Uninstalling

To uninstall the driver and management software, double click the "**rr2644-MacOSX-universal-vxxx-**" file.

1. Locate and double click the **"uninstall.command"** file.
2. This will initiate the uninstall script, and will open a Terminal window. Enter the administrator password when prompted, to delete the installed files

Web RAID Management Utility

Please refer to page 5-1 – the Web utility utilizes a universal interface, and operates in the same manner as revisions released for other operating systems.

Appendix
Customer Support

HighPoint

Customer Support

If you encounter any problems while utilizing the RocketRAID host adapter, or have any questions about this or any other HighPoint product, feel free to contact our Customer Support Department.

Troubleshooting Checklist

Before contacting our Customer Support department:

Make sure the latest BIOS, driver and RAID Software have been installed for the RocketRAID host adapter. Updates are available from our website.

Prepare a list of the computer system's hardware and software (motherboard, CPU, memory, other PCI devices/host adapters, operating system, applications)

Contact Information

E-mail address: support@highpoint-tech.com

Phone: 408-240-6119

9:00AM-5:00PM, Pacific Standard Time

Additional information about HighPoint products is available from our web site:

http://www.highpoint-tech.com

FCC Part 15 Class B Radio Frequency Interference statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment under FCC rules.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

European Union Compliance Statement

This Information Technologies Equipment has been tested and found to comply with the following European directives:

- European Standard EN55022 (1998) Class B
- European Standard EN55024 (1998)